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Modern Concepts of Cardiovascular Disease

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SURGERY IN THE TREATMENT OF HEART DISEASE

The surgical measures employed in the treatment of diseases of the heart may be either indirect or direct; that is, the surgical operation may be upon distant tissues or upon the heart itself. Of the operations that have an indirect effect upon the heart, perhaps the simplest is that for the correction of arteriovenous aneurysms. It has long been known that free communication between a large artery and vein has remarkable effects upon the heart and the peripheral circulation; excellent studies have revealed that many of these effects are practically identical with those resulting from free aortic regurgitation. Successful elimination of the arteriovenous communication usually results in fairly prompt disappearance of the cardiac enlargement and of the abnormal signs in the peripheral circulation.

A second condition in which the heart may benefit indirectly from an operation upon distant tissues is that known as hyperthyroidism. The many changes in the heart and circulation associated with the increased metabolism of hyperthyroidism are too well known to require enumeration; they usually include considerable tachycardia, moderate hypertension, and auricular fibrillation in a high percentage of those whose hyperthyroidism is long continued. There is still considerable uncertainty as to the exact cause and nature of hyperthyroidism, but there is general agreement that it can be virtually cured in most instances by the surgical removal of a large part of the thyroid gland. If subtotal thyroidectomy is successfully performed, the abnormal signs and symptoms referable to the heart usually disappear completely.

Total Thyroidectomy. A few years ago it was proposed that the thyroid gland should be completely extirpated for the treatment of anginal or congestive heart failure. There were many theoretical reasons for believing that this might prove beneficial, and the actual results in the first patients subjected to the operation seemed to be highly satisfactory. Increasing experience, however, failed to justify the earlier hopes, and the operation has now fallen into almost complete disuse. It is possibly of value in occasional patients whose heart failure is steadily progressing despite the best medical care, but even in these the results have not been such as to inspire widespread confidence in the measure.

Hypertension. The surgical treatment of hypertension rests upon the belief that an important cause of the condition is widespread constriction of arterioles, and that sympathetic nervous impulses are an important factor in causing this constriction. The various surgical measures proposed and practiced up to the present have one feature in common in that they aim at interruption of the sympathetic

nervous pathways to a large vascular territory. The operation most widely employed consists of resection of the splanchnic nerves below the diaphragm, together with the removal of the two upper lumbar sympathetic ganglia and a portion of the celiac ganglion. In some clinics the splanchnic nerves are resected above the diaphragm and the lower thoracic sympathetic ganglia are removed, while in others the operation is largely confined to the removal of the celiac ganglion.

The results obtained in different clinics have varied widely, and any general statement is apt to be inaccurate or incomplete. In the largest groups of patients that have been most carefully studied before and after operation, the results in general may be described as fairly satisfactory in a considerable percentage. In practically all cases there is an immediate fall in blood pressure and slight or great symptomatic improvement, but in a large number the blood pressure rises within a few weeks or months to the preoperative level, and the further course of the condition is unaffected. Practically all observers are agreed that the symptomatic improvement is often far greater than would be expected from the relatively slight reduction of the blood pressure.

There are many theoretical arguments against the operation and the beliefs upon which it rests, but most of these would seem to be invalidated by the excellent results obtained in many patients. Perhaps the most important adverse criticism at present is found in the observation that in every clinic some patients respond favorably to the operation and others do not, even though the preoperative tests and the operation itself are identical in the two groups. It is too soon as yet to make any final statement about the present value or ultimate status of these operations; the available evidence does not justify either sweeping condemnation or enthusiastic approval.

Cardiolysis. The operation known by the unfortunate term cardiolysis consists of the removal of several ribs and costal cartilages from the region directly overlying the heart. It has been performed in most instances because of the belief that the heart was firmly anchored to the ribs by dense adhesions, that its work was greatly increased by the constant tugging upon a rigid cage, and that this mechanical handicap ultimately caused cardiac hypertrophy and heart failure. Grave doubt has been cast upon the soundness of this belief in recent years, especially by Beck, who states that adhesions to the heart do not produce dilatation, hypertrophy, or failure; that if present they are silent and incidental findings, and that there is no reason to operate for

IMPORTANT NOTICE

The Fifteenth Scientific Meeting of the American Heart Association will be held at Hotel Jefferson, St. Louis, Missouri. The general cardiac program will be given on Friday, May 12, and the program of the Section for the Study of the Peripheral Circulation on Saturday, May 13.

Admission to meetings will be free to all 1939 paid-up members.

To non-members, a registration fee of \$2.00 will be charged.

their correction. His long experience in this field gives great weight to his views, and a study of autopsy records lends considerable support to his contention. However, there can apparently be no question that this operation has resulted in marked and dramatic clinical improvement in a number of authentic instances. It is conceivable that the improvement has resulted partly from prolonged bed rest incidental to the operation or from the fact that the enlarged heart has additional space in which to function, but these factors do not satisfactorily explain all the reported cases. The present reviewer has observed such conspicuous and lasting improvement in a small number of patients following this operation that he is unwilling to subscribe to the view that it should never be performed. The procedure is a simple one, performed under local anesthesia, and there should be no operative mortality. In most reported cases no attempt has been made to sever the adhesions between the heart and the bony thorax; removal of the ribs has seemed a simpler and more practical measure.

Anginal Heart Failure. While there is slight divergence of opinion concerning the cause of the substernal pain or oppression known as angina pectoris, the great majority of experienced and thoughtful observers regard it as due chiefly or wholly to a diminution of the blood flow to some portion of the heart. According to this view, anginal pain is experienced whenever the coronary blood flow is not adequate for the work demanded of the heart; it is an expression of myocardial ischemia, and is analogous to the pain of intermittent claudication. One type of surgical treatment has as its objective the elimination of the symptom, and makes no attempt to alter the fundamental abnormality responsible for it.

A few years ago it was demonstrated that apparently all the nerve fibres which convey pain impulses from the heart into the central nervous system converge in the upper four or five thoracic sympathetic ganglia, whence they are transmitted over the white communicant rami and posterior roots into the spinal cord. In the light of this anatomical finding, it seemed logical to attempt the interruption of pain impulses from the heart by resection of these ganglia or the injection of alcohol into them. Resection is a major operative procedure attended by a high mortality rate, so alcohol injections have been preferred.

The injection is performed under local anesthesia through lumbar puncture needles, and considerable experience is necessary for accurate placement of the alcohol. The operation has been performed in probably more than a hundred patients, but not all of these have been placed on record. In the largest reported group, that of Dr. James White of Boston, 63% have been entirely or almost entirely relieved of pain, and a further 26% have secured relief estimated at from 50 to 90 per cent. The chief objections to the procedure are the technical difficulty of placing the alcohol accurately in or immediately adjacent to the ganglia, and the development of severe neuritis in the majority of patients, caused by infiltration of alcohol into the intercostal nerves. This neuritis eventually disappears, but may persist for weeks or months. There are no serious permanent complications and no operative mortality. The results appear to be permanent in the majority of patients, and there is no indication that the removal of pain has increased the danger of sudden death from unwise or excessive exertion. In properly selected cases this operation is of great and proven value.

Pick's Disease. The prevailing belief today is that the syndrome formerly known as Pick's disease is actually due to chronic constrictive pericarditis. In this condition there is fibrous or bony thickening of the pericardium, which may become so constricted as to prevent the heart from dilating and filling normally in diastole. This results in the onset of edema, great enlargement of the liver, ascites, increased venous pressure, low arterial pressure, and a heart that is normal in size or smaller than normal.

The treatment is clearly indicated, and consists of the surgical removal of part or all of the constricting band or envelope. In the hands of experienced surgeons the operative mortality is very low and the results are often almost miraculous; chronic cardiac invalids have been restored to lives of perfectly normal activity. This operation is one of the great advances of recent years, and one of the major contributions of surgery to the treatment of heart disease.

Direct Surgical Treatment of Anginal Heart Failure. In addition to the two indirect surgical measures already mentioned for the relief of anginal pain (total thyroidectomy and paravertebral injections of alcohol) there are two direct methods which have been tried in the past several years. Both of them have as their objective the provision of a new and additional supply of blood to the heart. One of them consists of placing a portion of the pectoral muscle in direct contact with the epicardial surface, in the hope that new blood vessels will grow from the healthy pectoral muscle into the myocardium. This operation has been performed by Beck in more than twenty-five patients, and his reports should be consulted for a full discussion of the subject. There was unquestionable improvement in some of his patients, but in only three of the first twenty-five was it conspicuous. There are several important theoretical arguments against this operation, but even if these are ignored, a critical study of the actual results scarcely permits the belief that it will be of great value in the treatment of angina.

A second method for increasing the blood flow through the myocardium consists of the attachment of a portion of the omentum to the heart. There are many reasons for believing that the omentum is a more favorable tissue than the pectoral muscle for the growth of its blood vessels into needy organs; indeed it has been stated that it is the only tissue that has this peculiar property of vascularization. The operation, known as cardio-omentopexy, has been successfully performed by O'Shaughnessy of London in a small group of patients, and the results have been extraordinarily gratifying. Of the ten surviving patients reported a year ago, eight were apparently completely cured of anginal pain, and seven of these had returned to active work.

On the basis of available reports there would seem to be no question that omentopexy has given far greater individual improvement in the successful cases, and also in a higher percentage of the total group, than has the muscle grafting operation. Possibly both operations may ultimately be discarded as having little or no value, but if either survives, cardio-omentopexy would seem to be the more likely one.

Ligation of the Ductus Arteriosus. In February 1939, Gross and Hubbard reported the first successful ligation of a patent ductus arteriosus. It has long been known that patients with this congenital anomaly are subject to two serious hazards: they are peculiarly liable to bacterial endocarditis, and they may develop congestive heart failure because of the additional work imposed upon the left ventricle. Patency of the ductus affects the heart and peripheral circulation in the same manner as an arteriovenous aneurysm in one of the limbs, and on theoretical grounds its correction would seem even more desirable. In the reported case, a girl of seven years, the operation was very well borne, recovery was prompt, and the average level of the diastolic blood pressure rose from 38 to 80 mm. of mercury. This operation has been successfully performed by Gross in two other patients, but these have not been reported in detail. Thus one more hope has been realized and another brilliant contribution made to surgical therapy. To those patients who have patency of the duct as the only serious congenital cardiac lesion, this procedure would seem to offer greater hope of survival and of normal activity than has ever been possible heretofore.

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